

### Trend Study 25C-4-03

Study site name: North Slope.

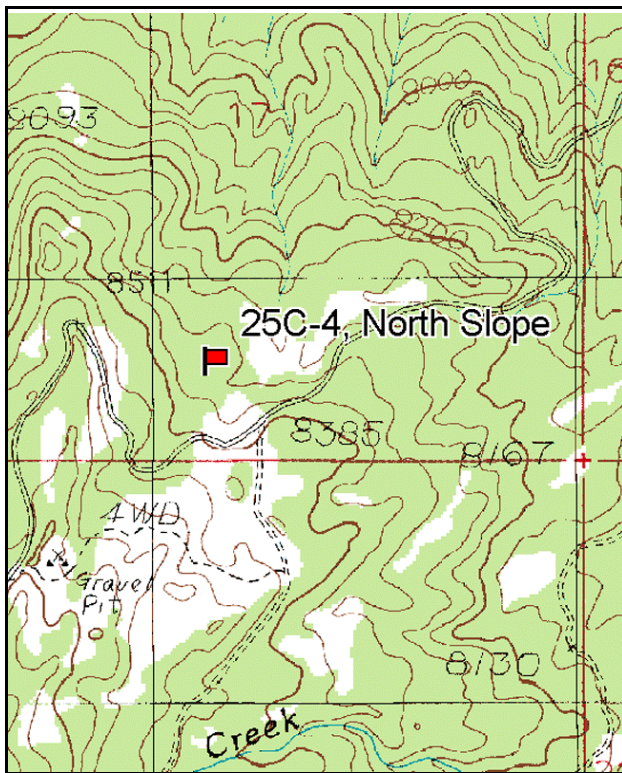
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 167 degrees magnetic. Lines 3-4, 270°M.

Frequency belt placement: line 1 (11 & 71ft), line 2 (34ft), line 3 (95ft), line 4 (59ft). Rebar: belt 2 on 3ft, belt 5 on 1ft.

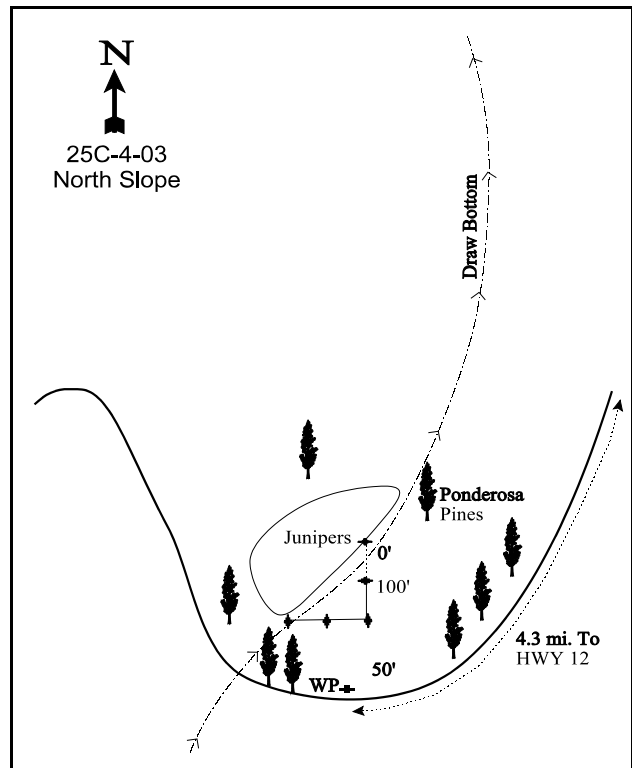
### LOCATION DESCRIPTION

From Grover, Utah, go 1.5 miles northwest on SR12 to the North Slope Road. Turn up this road staying left on the main road and continue for 4.3 miles. Stop before you get to a bend in the road near the head of a draw. Look for a witness post at the base of a Ponderosa Pine 10 feet below the road. The witness post is a 2½ foot steel rebar tagged #7181. The 200-foot stake is a full-high post 50 feet from the witness post. The 0-foot baseline stake is marked by browse tag #7077.



Map Name: Grover

Township 30S, Range 5E, Section 18



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4277713 N, 466205 E

## DISCUSSION

### North Slope - Trend Study No. 25C-4

This study is located on the north slope of Boulder Mountain above Fish Creek. The general exposure is north. The slope varies from 10% to 15% with an elevation of 8,300 feet. During the 1998 reading, the old frequency baseline was moved to better sample the site. It was originally established entirely within a thick juniper stand with little herbaceous understory while the density plots sampled the more open area across a wash. The new baseline is located entirely within the more open area where the key browse and herbaceous understory are more numerous. The area is used by deer primarily as transitional and summer range. Pellet group data taken along the study site baseline show an increasing amount of deer use since 1991. Data from 1991 estimated 40 deer days use/acre (99 ddu/ha) increasing to 50 deer days use/acre in 1998 and 66 in 2003 (124 ddu/ha and 164 ddu/ha). Elk use has remained low at only 3 elk days use/acre in 1998 and 1 day use/acre in 2003. Cattle use was heavy in 1998 at 36 days use/acre (89 cdu/ha) and more moderate at 15 cow days use/acre in 2003 (36 cdu/ha).

Soil at the site is very rocky on the surface and throughout the profile. Effective rooting depth was estimated at 10 inches. Rooting restrictions are evident in some places where black sagebrush occurs. Soil texture is a sandy loam which is moderately acidic in reaction (pH 5.9). There is a very small amount of bare soil exposed on the site. Some soil movement was noticeable in 1985, but erosion is currently not a problem due to the high percentage of litter and thick vegetation.

The vegetative community is composed of pinyon and juniper and some ponderosa pine with an understory of antelope bitterbrush, rabbitbrush, and perennial grass. Point-center quarter data from 2003 estimated 42 pinyon and 30 rocky mountain and Utah juniper trees/acre. A few ponderosa pine trees also occur on the site. The pinyon and juniper provide good escape and thermal cover. Nearby Forest Service chainings provide excellent deer winter range, and more pinyon-juniper chainings have been proposed by DWR for the North Slope area.

A variety of browse species are present, but only bitterbrush is available and palatable enough to be considered a key species. Bitterbrush makes up approximately 50% of the browse cover and density has changed little since 1985 when 1,598 plants/acre were estimated. Many of the older plants, which are above the snow cover in the winter, have been heavily hedged in the past. Utilization has been moderate to heavy in most years but vigor has remained normal and percent decadence low.

Black sagebrush and a few mountain big sagebrush are mixed in with the bitterbrush. Both species showed an increase in density between 1991 and 1998, but the larger sample used in 1998 is the major reason for the difference. Black sagebrush has shown mostly light use with moderate use on mountain big sagebrush in 1991 and 2003. Three species of rabbitbrush are found on the site including dwarf rabbitbrush, Parry rabbitbrush, and mountain low rabbitbrush. Of these, mountain low rabbitbrush is the most abundant with a density that has ranged between about 3,000 and 4,000 plants/acre since 1985. Most of these are unutilized. The increaser broom snakeweed is also found on the site in moderate numbers.

Several perennial grasses are found on the site with blue grama, a sedge, mutton bluegrass, and bottlebrush squirreltail being most numerous. All grasses combined to produce 23% cover in 1998, declining to only 13% in 2003. The large decline in grass cover comes primarily from a 53% decline in mutton bluegrass cover. Grasses were heavily utilized in 2003 and most of the larger preferred grasses were found only within the protection of shrub canopies. Shrub interspaces consist mostly of low growing mutton bluegrass and blue grama. There are a large variety of forbs on the site, although Louisiana sage, silvery lupine, and pussytoes are the most abundant and provide the majority of the forb cover. Average forb cover was estimated at 14% in 1998, declining to only 5% in 2003 due to drought conditions.

### 1985 APPARENT TREND ASSESSMENT

Good litter and vegetative cover provides protection for the soil and buildup appears to exceed any loss. Vegetative trend also appears stable. Some increasers are present, but appear to have stable populations. The bitterbrush is heavily hedged, but mostly protected by snow during the season of heaviest use and has good reproduction.

### 1991 TREND ASSESSMENT

This site continues to have excellent basic cover characteristics. Bare ground is only 6% with litter cover at 62%. Soil condition is stable. The key browse, antelope bitterbrush, is fairly stable at around 1,500 plants per acre. The number of decadent plants has increased from 4 to 17 percent. This level of decadence is still low, but of real concern is that the increaser species have expanded during this same period. The browse trend is considered stable. The herbaceous understory is stable at this time with about as many species increasing as decreasing.

#### TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

### 1998 TREND ASSESSMENT

The original frequency baseline was moved out of a thick juniper stand in order to sample the more important bitterbrush-grass vegetation. For this reason direct comparisons should not be made between 1991 and 1998 with regard to soil trends and herbaceous trends. The original baseline had a much higher pinyon and juniper density with considerable litter cover around these trees. Herbaceous vegetation was lacking. With this in mind, the soil trend on the expanded baseline appears stable with little bare ground exposed. Protective cover is abundant and well dispersed and no erosion is evident. Trend for bitterbrush is stable. There were less young plants sampled in 1998, but density of mature plants is similar to 1985 estimates. Utilization is more moderate, vigor normal, and percent decadence is low at only 3%. Density of increasers, including broom snakeweed and three species of rabbitbrush, are up for rabbitbrush, although down for snakeweed. More sagebrush, black sagebrush and mountain big sagebrush, was sampled in the larger sample of 1998. Trend for browse is considered stable. The herbaceous understory is diverse and abundant. Sum of nested frequency has increased dramatically, but much of the improvement is due to the relocation of the original frequency baseline. Trend is considered stable until data is available for direct comparison.

#### TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

### 2003 TREND ASSESSMENT

Trend for soil remains stable with good protective ground cover to prevent erosion. Trend for the key browse species, bitterbrush, is also stable. Density has remained stable since 1985 but young recruitment has declined since 1991. Use was heavy in 2003 and the number of decadent plants increased to 12% of the population. This is still low however. Annual leader growth was fair averaging nearly 3 inches. Increasers, parry and mountain low rabbitbrush and broom snakeweed have remained relatively stable in density and average cover. Trend for the herbaceous understory is down slightly for perennial grasses but more sharply down for perennial forbs. Sum of nested frequency of perennial grasses declined 18% with a significant decline in

nested frequency of bottlebrush squirreltail and bluebunch wheatgrass. Mutton bluegrass declined slightly in nested frequency but average cover dropped 53%. Total grass cover declined 44% since 1998 due to drought conditions. The forb composition is dominated by Louisiana sage and silvery lupine. Sum of nested frequency of perennial forbs declined 43% since 1998 and average cover dropped from 13% to 4%. Overall the herbaceous trend is considered down.

#### TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - down (1)

#### HERBACEOUS TRENDS --

Management unit 25C, Study no: 4

Type	Species	Nested Frequency				Average Cover %	
		'85	'91	'98	'03	'98	'03
G	Agropyron spicatum	<sub>a</sub> 1	<sub>ab</sub> 5	<sub>b</sub> 16	<sub>a</sub> -	.35	-
G	Bouteloua gracilis	<sub>ab</sub> 172	<sub>a</sub> 139	<sub>b</sub> 206	<sub>b</sub> 203	8.07	6.58
G	Bromus anomalus	2	3	-	-	-	-
G	Carex spp.	28	29	51	31	1.17	.41
G	Oryzopsis hymenoides	3	3	-	1	-	.00
G	Poa fendleriana	<sub>a</sub> 46	<sub>a</sub> 48	<sub>b</sub> 192	<sub>b</sub> 173	11.08	5.25
G	Sitanion hystrix	<sub>a</sub> 43	<sub>a</sub> 56	<sub>b</sub> 104	<sub>a</sub> 56	2.24	.53
G	Stipa comata	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 23	<sub>b</sub> 19	.41	.40
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		295	283	592	483	23.33	13.19
Total for Grasses		295	283	592	483	23.33	13.19
F	Alyssum alyssoides (a)	-	-	<sub>a</sub> -	<sub>b</sub> 15	-	.23
F	Allium spp.	-	-	1	-	.00	-
F	Antennaria parvifolia	<sub>a</sub> 5	<sub>ab</sub> 8	<sub>c</sub> 31	<sub>bc</sub> 26	1.68	.20
F	Androsace septentrionalis (a)	-	-	<sub>b</sub> 95	<sub>a</sub> 27	.93	.08
F	Arabis demissa	8	17	8	5	.07	.04
F	Artemisia dracunculus	<sub>c</sub> 54	<sub>a</sub> -	<sub>b</sub> 23	<sub>b</sub> 10	.91	.14
F	Artemisia ludoviciana	<sub>b</sub> 70	<sub>a</sub> 2	<sub>c</sub> 116	<sub>b</sub> 52	3.14	.86
F	Castilleja linariaefolia	-	3	-	-	-	-
F	Chenopodium album (a)	-	-	<sub>a</sub> -	<sub>b</sub> 53	-	.28
F	Chaenactis douglasii	-	-	6	-	.01	-
F	Chenopodium leptophyllum(a)	-	-	<sub>a</sub> -	<sub>b</sub> 44	-	.16
F	Cirsium spp.	-	-	2	-	.00	-
F	Cryptantha spp.	3	-	-	-	-	-
F	Descurainia pinnata (a)	-	-	8	3	.02	.03

Type	Species	Nested Frequency				Average Cover %	
		'85	'91	'98	'03	'98	'03
F	Draba spp. (a)	-	-	-	1	-	.00
F	Eriogonum alatum	-	-	-	-	-	.00
F	Erigeron eatonii	<sub>a</sub> 6	<sub>a</sub> 3	<sub>b</sub> 17	<sub>a</sub> 4	.34	.06
F	Erigeron flagellaris	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 10	<sub>ab</sub> 9	.25	.06
F	Eriogonum spp.	-	-	2	-	.03	-
F	Erigeron pumilus	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 10	<sub>b</sub> 12	.24	.15
F	Eriogonum racemosum	<sub>a</sub> 5	<sub>a</sub> 1	<sub>b</sub> 32	<sub>b</sub> 26	.30	.22
F	Gayophytum ramosissimum(a)	-	-	-	6	-	.01
F	Gilia spp. (a)	-	-	2	-	.01	-
F	Holosteum umbellatum (a)	-	-	-	3	-	.00
F	Hymenoxys richardsonii	5	-	3	1	.03	.03
F	Lappula occidentalis (a)	-	-	9	8	.02	.07
F	Lepidium spp. (a)	-	-	31	8	.11	.02
F	Lupinus argenteus	<sub>b</sub> 29	<sub>a</sub> -	<sub>c</sub> 82	<sub>b</sub> 49	5.08	1.25
F	Lychnis drummondii	-	4	-	-	-	-
F	Lygodesmia spp.	<sub>a</sub> -	<sub>a</sub> -	<sub>c</sub> 17	<sub>b</sub> 6	.44	.25
F	Penstemon comarrhenus	-	2	8	3	.18	.03
F	Petradoria pumila	2	1	1	4	.15	.15
F	Potentilla concinna	-	-	-	1	-	.03
F	Polygonum douglasii (a)	-	-	5	-	.01	-
F	Potentilla gracilis	<sub>a</sub> -	<sub>b</sub> 18	<sub>b</sub> 14	<sub>b</sub> 6	.12	.05
F	Pteridium aquilinum	-	1	-	-	-	-
F	Sphaeralcea coccinea	4	10	10	6	.07	.21
F	Taraxacum officinale	-	-	1	-	.00	-
F	Tragopogon dubius	-	-	3	-	.01	-
F	Unknown forb-perennial	-	3	1	7	.00	.15
Total for Annual Forbs		0	0	150	168	1.11	0.91
Total for Perennial Forbs		191	73	398	227	13.12	3.94
Total for Forbs		191	73	548	395	14.24	4.85

Values with different subscript letters are significantly different at alpha = 0.10

## BROWSE TRENDS --

Management unit 25C, Study no: 4

Type	Species	Strip Frequency		Average Cover %	
		'98	'03	'98	'03
B	Artemisia nova	15	11	1.84	1.52
B	Artemisia tridentata vaseyana	4	7	.30	.33
B	Chrysothamnus depressus	7	0	.19	-
B	Chrysothamnus parryi	22	25	.81	.82
B	Chrysothamnus viscidiflorus lanceolatus	80	80	7.83	8.01
B	Gutierrezia sarothrae	29	17	.80	.36
B	Juniperus scopulorum	0	0	1.48	1.48
B	Pediocactus simpsonii	3	4	.09	.06
B	Pinus edulis	2	1	.78	1.75
B	Pinus ponderosa	0	0	.00	-
B	Potentilla fruticosa	0	0	-	.00
B	Purshia tridentata	51	48	14.16	15.80
B	Tetradymia canescens	4	5	.15	.03
Total for Browse		217	198	28.46	30.18

## CANOPY COVER, LINE INTERCEPT --

Management unit 25C, Study no: 4

Species	Percent Cover	
	'98	'03
Artemisia nova	-	1.79
Artemisia tridentata vaseyana	-	.18
Chrysothamnus parryi	-	.75
Chrysothamnus viscidiflorus lanceolatus	-	6.03
Gutierrezia sarothrae	-	.40
Juniperus scopulorum	2.59	2.11
Pinus edulis	2.20	1.93
Purshia tridentata	-	17.85
Tetradymia canescens	-	.05

KEY BROWSE ANNUAL LEADER GROWTH --  
Management unit 25C, Study no: 4

Species	Average leader growth (in)
	'03
Purshia tridentata	2.9

POINT-QUARTER TREE DATA --  
Management unit 25C, Study no: 4

Species	Trees per Acre		Average diameter (in)	
	'98	'03	'98	'03
Juniperus scopulorum/osteosperma	10	30	4.6	6.6
Pinus edulis	17	42	4.4	4.2
Pinus ponderosa	8	N/A	15.1	N/A

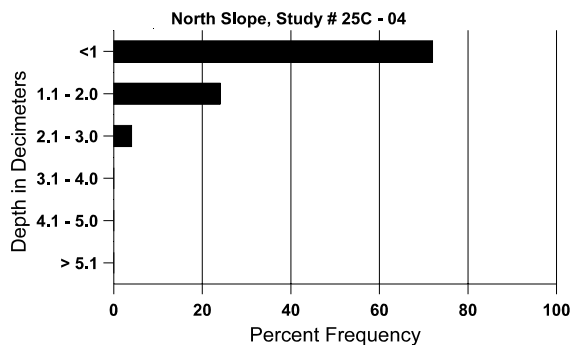
BASIC COVER --  
Management unit 25C, Study no: 4

Cover Type	Average Cover %			
	'85	'91	'98	'03
Vegetation	4.00	3.25	54.93	45.06
Rock	21.00	22.25	14.30	17.25
Pavement	9.00	5.25	8.15	7.00
Litter	60.00	62.00	49.14	39.52
Cryptogams	1.75	1.50	4.07	.19
Bare Ground	4.25	5.75	9.61	10.79

SOIL ANALYSIS DATA --  
Management unit 25C, Study no: 4, Study Name: North Slope

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m
10.0	56.3 (10.4)	5.9	64.0	19.4	16.6	2.8	12.0	137.6	0.5

## Stoniness Index



PELLET GROUP DATA --

Management unit 25C, Study no: 4

Type	Quadrat Frequency		Days use per acre (ha)		
	'98	'03	'91	'98	'03
Rabbit	25	24	-	-	-
Elk	4	4	9 (22)	3 (7)	1 (2)
Deer	30	37	40 (99)	50 (124)	66 (164)
Cattle	12	5	-	36 (89)	15 (36)

BROWSE CHARACTERISTICS --

Management unit 25C, Study no: 4

		Age class distribution (plants per acre)					Utilization				
Y e a r	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
<i>Artemisia nova</i>											
85	<b>0</b>	-	-	-	-	-	0	0	0	0	-/-
91	<b>266</b>	-	66	200	-	-	0	0	0	0	7/8
98	<b>1000</b>	40	500	480	20	40	2	0	2	2	12/19
03	<b>820</b>	-	-	620	200	120	17	0	24	20	10/14
<i>Artemisia tridentata vaseyana</i>											
85	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
91	<b>66</b>	-	66	-	-	-	100	0	-	0	-/-
98	<b>220</b>	-	60	160	-	60	0	0	-	0	19/27
03	<b>300</b>	-	20	280	-	20	47	7	-	0	22/25
<i>Chrysothamnus depressus</i>											
85	<b>0</b>	-	-	-	-	-	0	0	0	0	-/-
91	<b>332</b>	-	-	266	66	-	0	60	20	0	4/7
98	<b>260</b>	-	-	240	20	-	0	0	8	0	8/11
03	<b>0</b>	-	-	-	-	-	0	0	0	0	-/-
<i>Chrysothamnus parryi</i>											
85	<b>2400</b>	-	400	2000	-	-	3	0	0	0	8/7
91	<b>466</b>	-	-	466	-	-	0	0	0	0	6/9
98	<b>940</b>	-	60	720	160	-	0	0	17	0	10/10
03	<b>820</b>	-	80	740	-	-	49	7	0	0	8/10
<i>Chrysothamnus viscidiflorus lanceolatus</i>											
85	<b>3866</b>	600	666	3000	200	-	10	0	5	2	19/13
91	<b>2866</b>	-	533	1800	533	-	19	7	19	2	13/16
98	<b>4060</b>	-	300	3300	460	20	2	0	11	.98	18/20

		Age class distribution (plants per acre)					Utilization				
Y e a r	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
03	<b>4300</b>	40	320	3500	480	20	7	0	11	.46	16/20
<i>Gutierrezia sarothrae</i>											
85	<b>666</b>	-	66	600	-	-	0	0	0	0	9/7
91	<b>3065</b>	66	1066	1733	266	-	2	0	9	0	6/5
98	<b>1400</b>	-	60	1260	80	-	0	0	6	3	9/11
03	<b>900</b>	-	140	760	-	-	0	0	0	0	7/6
<i>Juniperus scopulorum</i>											
85	<b>66</b>	-	-	66	-	-	0	0	-	0	69/89
91	<b>66</b>	-	-	66	-	-	0	0	-	0	109/125
98	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
03	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
<i>Pediocactus simpsonii</i>											
85	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
91	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
98	<b>80</b>	20	-	80	-	-	0	0	-	0	1/4
03	<b>80</b>	-	-	80	-	-	0	0	-	0	1/4
<i>Pinus edulis</i>											
85	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
91	<b>0</b>	133	-	-	-	-	0	0	-	0	-/-
98	<b>40</b>	20	20	20	-	-	0	0	-	0	-/-
03	<b>20</b>	20	20	-	-	-	0	0	-	0	-/-
<i>Potentilla fruticosa</i>											
85	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
91	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
98	<b>0</b>	-	-	-	-	-	0	0	-	0	-/-
03	<b>0</b>	20	-	-	-	-	0	0	-	0	-/-
<i>Purshia tridentata</i>											
85	<b>1598</b>	266	266	1266	66	-	50	33	4	0	24/35
91	<b>1532</b>	-	400	866	266	-	48	30	17	4	14/28
98	<b>2000</b>	120	180	1760	60	80	77	1	3	0	21/45
03	<b>1540</b>	-	60	1300	180	20	31	62	12	0	25/52
<i>Tetradymia canescens</i>											
85	<b>0</b>	-	-	-	-	-	0	0	0	0	-/-
91	<b>0</b>	-	-	-	-	-	0	0	0	0	-/-
98	<b>80</b>	-	-	60	20	-	0	0	25	0	12/15
03	<b>120</b>	-	-	80	40	-	0	17	33	17	8/12